Millet processing

Principles, Techniques and Challenges

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13th May 2020
About the Know Millets Webinars

- Different aspects of millets
  - Ecology
  - Historical context
  - Sustainable food systems
  - Community centric
  - Nutrition & Socio – economics
  - Technology & Engineering

Sustainable food systems perspective

Please note slide number for easy reference during Q&A

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In this presentation

- Types of Millets
  - Naked grains
  - Husked grains

- Stages of processing
  - Grading
  - Destoning
  - Dehusking
  - Cleaning

- Challenges in Millet Processing

- Summary
Types of Millets – Naked Grains

- No husk layer
- Might have a significant glume layer
- Higher susceptibility to pests
- Typically used in its flour form
- Even today
  - Widely grown and used
  - Local infrastructure & skills exist
Types of Millets – Husked Grains

△ Hard cellulosic husk layer
△ Extremely low susceptibility to pests (as long as husk is intact)
△ Typically used in its rice form
△ Need to rebuild
  ✩ Cultivation practices
  ✩ Consumption practices
  ✩ Local infrastructure
  ✩ Skills
Processing naked grains

Steps in primary processing
- Pre-cleaning
- Grading
- Milling
- Sieving/Cleaning

For a typical unit
- Machines & tools - ₹.1 to 5L
- 2 people
Processing husked grains

- Steps in primary processing
  - Pre-cleaning
  - Grading
  - Dehusking / hulling
  - Cleaning

- For a typical unit
  - Machines & tools - ₹.5 to 25L
  - 2 + 1 people
  - Training

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Pre cleaning

- As received grains
- Principles
  - Differences
    - Density
    - Size
- Removed material
  - Coarse (larger) MOTG
    (Material other than grains)
  - Fine (smaller) MOTG

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Grading

- Pre cleaned grains

- Principles
  - Differences in
    - size
    - density

- Select grains by
  - Size
  - Density

Input grains ➔ Large sized grains fraction

Input grains ➔ Small sized grains fraction

Input grains ➔ Intermediate sized grain fraction

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Destoning

► Graded grains

► Principles
  ✦ Differences in density

► Removed material
  ✦ Stones & pebbles
  ✦ Seed grade grains
Dehusking / Hulling or Milling

Husked grains

- Huller ready grains
- Husk layer
  - Remove
- Bran layer
  - Retain
  - Minimize damage

Naked grains

- Milling ready grains
- Mill / ground to flour
- Even / Uniform milling
Cleaning

Husked grains

- From Hulling machine/op
- Remove
  - unhulled grains
  - Grits & flour
- Minimize
  - Bran loss
  - Bran damage

Naked grains

- Milled flour
- Remove
  - Grits
  - Unmilled bran

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Challenges in Millet Processing – 1

- Variation in grain characteristics
  - Size
  - Brittleness of the husk
  - Kernel shattering
  - Bran characteristics

- Causes
  - Variety
  - Season
  - Cultivation practices

- Steps to overcome
  - Flexibility in
    - Machines & Tools
    - Process
  - Skill Development
Challenges in Millet Processing – 2

- **Bran layer**
  - retaining it
    - Simple testing
    - Minimizing damage
    - Hard to test

- **Appropriate design**
  - Machines & Tools
  - Process

- **Skill Development**
Challenges in Millet Processing – 3

- **Pest Management**
  - Nutritious for all species!
  - Infestation probability maximum at processing unit

- **Appropriate design**
  - Processing space
  - Machines & Tools
  - Process
  - Material Handling

- **Skill Development**

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13/05/2020
Summary

🔺 Simple principles
🔺 Easy for those who are trained
🔺 Appropriate (re)design of machines & tools
🔺 Skill development
🔺 Shorter & tighter supply chain

The IDRC – DHAN Community scale Small Millet Processing
Summary of Material Flow

Legend

- **Machine**
- **Secondary product**
- **discard**
- **Primary product**

Farm cleaned Millet grains

Grader (with Aspirator) ➔ Grader ➔ Destoner ➔ Destoner

Legend:

- Dust & Light MOTG
- Large size foreign material: pebbles, mud balls, straw, etc.
- Shattered millet kernel
- Unpolished Millet rice
- Broken Millet rice kernel
- Millet husk
- Millet husk rich flour
- Premium Q grains/seeds
- Unfilled grains – high Q component for cattle / bird feed
- Pebbles – soil additive

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Tue 6 December 2015
Thank you!

For more info...

http://themillet.org
http://millets.wordpress.org
http://rainfedindia.org